

NAVAL HEALTH RESEARCH CENTER

Department of Defense Birth and Infant Health Registry:

*Annual Report on Birth Defects Among Infants
Born to U.S. Military Families,
January 1, 2000 through December 31, 2000*

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Table of Contents

I. Abstract.....	3
II. Introduction	4
III. Methods.....	4
IV. Data Tables for 2000 Births	
Table 1. Characteristics of Infants in the DoD Birth and Infant Health Registry.....	7
Table 2. Types of Birth Defects and Gender of Infant	9
Table 3. Types of Birth Defects and Maternal Age	10
Table 4. Types of Birth Defects and Race/Ethnicity of Military Sponsor.....	11
Table 5. Types of Birth Defects and Maternal Military and Marital Status	12
Table 6. Types of Birth Defects and Pay Grade of Sponsor	13
Table 7. Types of Birth Defects and Branch of Service of Sponsor.....	14
Table 8. Types of Birth Defects and Geographical Location of Birth.....	15
Table 9a. Types of Birth Defects and Mother’s Occupational Code for Births to Military Mothers	17
Table 9b. Types of Birth Defects and Father’s Occupational Code for Births to Military Fathers	18
Table 10. Types of Birth Defects and Singleton and Multiple Births	19
Table 11. Multivariable Analyses: Adjusted Odds for Any Birth Defect.....	20
V. Acknowledgments.....	22
VI. References.....	23
VII. Appendix A. ICD-9-CM Codes for Major Birth Defects.....	24

Abstract

The US Department of Defense (DoD) is challenged with monitoring and protecting the health and well-being of its service members. The growing number of women on active duty and the diverse hazardous exposures associated with military service make reproductive health issues a special concern. To address this concern, the DoD Birth and Infant Health Registry was established at the DoD Center for Deployment Health Research, located at the Naval Health Research Center in San Diego, California. The DoD Birth and Infant Health Registry captures comprehensive data on healthcare utilization to calculate the prevalence of birth defects among children born to military families. Population-based electronic surveillance is supplemented by active case validation efforts. In 2000, the DoD Birth and Infant Health Registry captured data on the 95,704 livebirths that occurred in US military families worldwide. This report presents detailed data on these infants using nationally standardized definitions for major congenital anomalies diagnosed before 1 year of age. These results complement civilian public health surveillance efforts and may be especially valuable to military members and their families.

Introduction

Concern about the reproductive health of service members and their families is consistent with the US military's concept of Force Health Protection.¹ Although reproductive health issues affect both men and women, the growing proportion of women in the military (now greater than 14% of active-duty forces) may have heightened concerns about potential hazards associated with military duty.^{2,3}

Public health efforts to address reproductive issues in the Department of Defense (DoD) are similar to efforts in the civilian sector. The military may have some unique concerns, however, related to severe stressors⁴ and the wartime deployment of its population. The US experience in the Persian Gulf War of 1991 underscored concerns about all health risks of deployment, and of reproductive health risks in particular.⁵

To address these concerns, the Assistant Secretary of Defense for Health Affairs directed the establishment of national surveillance for birth defects among DoD families on November 17, 1999.⁶ Professionals at the DoD Center for Deployment Health Research at the Naval Health Research Center, San Diego, California, manage the DoD Birth and Infant Health Registry and provide systematic surveillance of DoD beneficiary births and calculations of birth defects prevalence. Establishment of the DoD Birth and Infant Health Registry (formerly called the DoD Birth Defects Registry) has been previously described.^{7,8}

This annual report presents information on birth defects among infants born to US military families between January 1, 2000, and December 31, 2000.

Methods

Population

All DoD-sponsored livebirths of all gestational ages and birth weights are identified in the DoD Birth and Infant Health Registry. To be DoD sponsored, at least one parent must be a DoD healthcare beneficiary, such as an active-duty military member, active Reservist or National Guard member, military retiree, or other dependent. DoD-sponsored infants are born at military and civilian medical facilities in all 50 states and the District of Columbia, and in more than 30 foreign countries.

Birth Defect Case Definition

To be identified as a birth defect case in the DoD Birth and Infant Health Registry, the infant must be diagnosed with a major structural or chromosomal birth defect within the first year of life. Appendix A lists these defects, and is consistent with National Birth Defect Prevention Network definitions.⁹

Data Sources

DoD Birth and Infant Health Registry data analysts have established direct access to large databases to thoroughly capture all livebirths and birth defect cases in military families. The Standard Inpatient Data Record system represents hospitalizations at military medical facilities, with up to 8 discharge diagnoses coded from the International Classification of Diseases, 9th

Revision, Clinical Modification (ICD-9-CM) system.¹⁰ The Standard Ambulatory Data Record system represents all outpatient encounters at DoD medical facilities, with up to 4 ICD-9-CM-coded diagnoses. For DoD-financed healthcare (inpatient or outpatient) at civilian medical facilities, the DoD TRICARE insurance system maintains complete records with ICD-9-CM-coded diagnoses.

DoD's ability to capture records of all healthcare encounters, both inpatient and outpatient, from virtually any medical facility worldwide is analogous to a large managed-care organization. DoD codes healthcare data with the military member's social security number. These data can be easily linked to demographic and service-related information on active-duty members in the Defense Enrollment Eligibility Reporting System and the Defense Manpower Data Center. Such data can provide important profiles of military parents, including deployment and occupational exposure histories that may be relevant to birth defects research.

Validation Methods

Validation of infant diagnoses captured in the DoD Birth and Infant Health Registry is essential to the integrity of this large electronic surveillance system. To improve the quality of the complete inpatient and outpatient data captured, DoD Birth and Infant Health Registry analysts have developed complex algorithms to identify and remove multiple entries for the same diagnoses in the same infants. Other algorithms accurately identify multiple births to the same sponsor. The resulting analytic database includes only one entry for each child born to a military family in any given surveillance period. Each entry includes all ICD-9-CM-coded birth defects diagnosed within 1 year after delivery.

To assess potential underreporting, overreporting, or miscoding of electronic diagnostic data, active case validation is performed through medical records review from a random sample of births at both military and civilian facilities. Professional abstractors, including a physician, will review records and compare medical diagnoses to electronic surveillance data to validate the presence of birth defects and the ICD-9-CM codes used.

Statistical Analyses

The prevalence of any major birth defect in military infants born in 2000 was calculated. Prevalence rates were also calculated according to basic demographic characteristics, including: infant gender, maternal age, military sponsor's race/ethnicity, maternal marital status, sponsor's pay grade, sponsor's branch of service, geographical location of birth, and sponsor's occupation. Prevalence was also calculated for singleton births separate from multiple births (ie, twins, triplets). Univariate analyses were performed across each demographic characteristic. Types of birth defects, according to nationally standardized categories were calculated and tabulated according to demographic characteristics.

A multivariable logistic regression model was developed to describe odds associated with the appearance of any defect, controlling for important demographic factors. The saturated, rather than reduced, multivariable model results are shown in this report. All analyses were performed using SAS software, Version 9.¹¹

Limitations

As with most other birth defects registries,^{12,13} the DoD system cannot capture data on pregnancy terminations, miscarriages, or stillbirths. Other limitations associated with the DoD Registry include its reliance on ICD-9-CM coding for diagnosing birth defects. The active case validation efforts can only partially mitigate this challenge. Additional limitations may be related to the dynamics of the changing military population. Eligibility for DoD care at birth may not correspond to eligibility at the time of conception and pregnancy. Some children conceived before a parent's active-duty service may be represented in the DoD Birth and Infant Health Registry; some children conceived on active duty may be born outside of the DoD system if a member leaves the service or uses an alternative insurance system.

Strengths and Future Directions

The DoD Birth and Infant Health Registry completely captures its intended data through an active electronic medical records system. The DoD Registry is one of the largest and most comprehensive birth defects surveillance systems in the United States, and it contributes to important national surveillance data.⁹ This report shows surveillance data for infants born to military families in 2000, and it is consistent in format to the annual reports of 1998 and 1999 births. More detailed analyses may be available in other publications.

Data Tables for 2000 Births

Table 1. Characteristics of Infants in the DoD Birth and Infant Health Registry*

Characteristics	No Birth Defect 91,159 (95.25)	Any Birth Defect 4545 (4.75)	<i>P</i> value ^a
Gender of infant			
Male	48,732 (94.86)	2642 (5.14)	
Female	42,427 (95.71)	1903 (4.29)	<.0001
Maternal age, y			
13-19	7257 (95.64)	331 (4.36)	
20-24	29,905 (95.29)	1477 (4.71)	
25-29	24,247 (95.51)	1141 (4.49)	
30-34	15,553 (94.92)	832 (5.08)	
35-39	6038 (94.45)	355 (5.55)	
>39	978 (92.35)	81 (7.65)	
Unknown	7181 (95.63)	328 (4.37)	<.0001
Race/ethnicity of military sponsor			
White	58,757 (95.07)	3050 (4.93)	
Black	16,470 (95.25)	821 (4.75)	
Hispanic	7697 (95.53)	360 (4.47)	
Asian	3073 (95.94)	130 (4.06)	
Other	5162 (96.56)	184 (3.44)	<.0001
Maternal military and marital status			
Military, single	4854 (95.20)	245 (4.80)	
Military, married	5331 (95.44)	255 (4.56)	
Dual military marriage	6533 (95.81)	286 (4.19)	
Dependent wife	70,733 (95.12)	3627 (4.88)	
Other	3708 (96.56)	132 (3.44)	0.0002
Pay grade of sponsor			
E1-E3	19,293 (95.25)	962 (4.75)	
E4-E6	47,355 (95.09)	2445 (4.91)	
E7-E9	4851 (95.10)	250 (4.90)	
O1-O3	10,844 (95.12)	556 (4.88)	
O4-O8	3623 (94.47)	212 (5.53)	
W1-W5	745 (94.42)	44 (5.58)	
Unknown	4448 (98.32)	76 (1.68)	<.0001

Table 1. Characteristics of Infants in the DoD Birth and Infant Health Registry (*cont.*)^{*}

Characteristics	No Birth Defect	Any Birth Defect	<i>P</i> value ^a
Branch of service of sponsor			
Army	31,414 (95.13)	1609 (4.87)	0.317
Navy	21,375 (95.26)	1064 (4.74)	
Marines	10,374 (95.27)	515 (4.73)	
Air Force	21,948 (95.27)	1089 (4.73)	
Unknown	6048 (95.76)	268 (4.24)	
Geographical location of birth			
California	9692 (95.38)	469 (4.62)	<.0001
Florida	4412 (95.09)	228 (4.91)	
Georgia	3731 (96.18)	148 (3.82)	
Germany	2069 (96.14)	83 (3.86)	
Hawaii	2627 (96.47)	96 (3.53)	
Japan	2202 (97.69)	52 (2.31)	
Kentucky	2464 (93.44)	173 (6.56)	
Maryland	1966 (95.44)	94 (4.56)	
North Carolina	6339 (95.41)	305 (4.59)	
Other–NE ^b	6517 (94.67)	367 (5.33)	
Other–NW ^c	9835 (95.41)	473 (4.59)	
Other–SE ^d	3745 (95.49)	177 (4.51)	
Other–SW ^e	5508 (95.58)	255 (4.42)	
Texas	7776 (95.46)	370 (4.54)	
Virginia	8320 (95.35)	406 (4.65)	
Washington	3752 (92.32)	312 (7.68)	
Unknown	6489 (94.48)	379 (5.52)	
Other foreign	3715 (95.92)	158 (4.08)	
Singleton or multiple births			
Singleton	87,329 (95.34)	4272 (4.66)	<.0001
Multiple	3830 (93.35)	273 (6.65)	
Total DoD births for 2000	95,704		

^{*}E indicates enlisted; O, officer; and W, warrant officer.

^a*P* values determined by Pearson chi-squared tests.

^bNortheast (16 states): Connecticut, District of Columbia, Illinois, Indiana, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, Wisconsin.

^cNorthwest (15 states): Alaska, Colorado, Idaho, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, Nevada, North Dakota, Oregon, South Dakota, Utah, Wyoming.

^dSoutheast (4 states): Alabama, Mississippi, South Carolina, Tennessee.

^eSouthwest (5 states): Arizona, Arkansas, Louisiana, New Mexico, Oklahoma.

Table 2. Types of Birth Defects and Gender of Infant

Type of Birth Defects ^a	Male	Female	<i>P</i> value ^c
	N = 51,374 N (cases per 1000) ^b	N = 44,330 N (cases per 1000) ^b	
Nervous system	213 (4.15)	160 (3.61)	0.13
Eye	38 (0.74)	40 (0.90)	0.43
Ear	12 (0.23)	13 (0.29)	0.67
Heart	1336 (26.01)	1231 (27.77)	0.10
Respiratory	16 (0.31)	11 (0.25)	0.55
Cleft lip/palate	109 (2.12)	83 (1.87)	0.45
Upper alimentary	24 (0.47)	19 (0.43)	0.84
Digestive system	303 (5.90)	147 (3.32)	<0.001
Male reproductive ^d	502 (9.77)	NA	<0.001
Urinary	271 (5.28)	110 (2.48)	<0.001
Musculoskeletal	137 (2.67)	287 (6.47)	<0.001
Limb	42 (0.82)	26 (0.59)	0.20
Other musculoskeletal	47 (0.92)	44 (0.99)	0.74
DNA	89 (1.73)	77 (1.74)	1.00
Alcohol	4 (0.08)	2 (0.05)	0.71

^aSee Appendix A for ICD-9-CM birth defects codes and abbreviations.

^bColumn count totals may reflect multiple birth defect diagnoses in some children.

^c*P* values determined by Monte Carlo estimates for the Pearson chi-squared exact test.

^dRates for “Male reproductive” defect category based on total male births for 2000.

Table 3. Types of Birth Defects and Maternal Age

Type of Birth Defects ^a	13-19, y N = 7588 n (cases per 1000) ^b	20-24, y N = 31,382 n (cases per 1000) ^b	25-29, y N = 25,388 n (cases per 1000) ^b	30-34, y N = 16,385 n (cases per 1000) ^b	35-39, y N = 6393 n (cases per 1000) ^b	>39, y N = 1059 n (cases per 1000) ^b	Unknown N = 7509 n (cases per 1000) ^b	P value ^c
Nervous system	24 (3.16)	110 (3.51)	96 (3.78)	73 (4.46)	32 (5.01)	6 (5.67)	32 (4.26)	0.35
Eye	5 (0.66)	22 (0.70)	24 (0.95)	12 (0.73)	9 (1.41)	2 (1.89)	4 (0.53)	0.35
Ear	0 (0.00)	9 (0.29)	7 (0.28)	6 (0.37)	1 (0.16)	1 (0.94)	1 (0.13)	0.48
Heart	177 (23.33)	834 (26.58)	579 (22.81)	470 (28.69)	217 (33.94)	59 (55.71)	231 (30.76)	<0.001
Respiratory	1 (0.13)	8 (0.26)	9 (0.35)	5 (0.31)	1 (0.16)	0 (0.00)	3 (0.40)	0.91
Cleft lip/palate	14 (1.85)	69 (2.20)	58 (2.29)	21 (1.28)	14 (2.19)	2 (1.89)	14 (1.86)	0.38
Upper alimentary	2 (0.26)	16 (0.51)	5 (0.20)	9 (0.55)	5 (0.78)	1 (0.94)	5 (0.67)	0.21
Digestive system	34 (4.48)	176 (5.61)	121 (4.77)	64 (3.91)	20 (3.13)	3 (2.83)	32 (4.26)	0.06
Male reproductive ^d	42 (10.47)	136 (8.25)	142 (10.51)	90 (10.59)	46 (13.46)	8 (14.31)	38 (7.78)	0.04
Urinary	24 (3.16)	139 (4.43)	85 (3.35)	71 (4.33)	36 (5.63)	4 (3.78)	22 (2.93)	0.05
Musculoskeletal	29 (3.82)	135 (4.30)	108 (4.25)	97 (5.92)	25 (3.91)	6 (5.67)	24 (3.20)	0.06
Limb	5 (0.66)	15 (0.48)	28 (1.10)	12 (0.73)	7 (1.10)	0 (0.00)	1 (0.13)	0.04
Other musculoskeletal	16 (2.11)	35 (1.12)	17 (0.67)	7 (0.43)	5 (0.78)	2 (1.89)	9 (1.20)	0.01
DNA	11 (1.45)	31 (0.99)	34 (1.34)	35 (2.14)	21 (3.29)	18 (17.00)	16 (2.13)	<0.001
Alcohol	0 (0.00)	2 (0.06)	3 (0.12)	0 (0.00)	0 (0.00)	1 (0.94)	0 (0.00)	0.06

^aSee Appendix A for ICD-9-CM birth defects codes and abbreviations.^bColumn count totals may reflect multiple birth defect diagnoses in some children.^cP values determined by Monte Carlo estimates for the Pearson chi-squared exact test.^dRates for “Male reproductive” defect category based on total male births for 2000.

Table 4. Types of Birth Defects and Race/Ethnicity of Military Sponsor

Type of Birth Defects ^a	White N = 61,807 n (cases per 1000) ^b	Black N = 17,291 n (cases per 1000) ^b	Hispanic N = 8057 n (cases per 1000) ^b	Asian N = 3203 n (cases per 1000) ^b	Other N = 5346 n (cases per 1000) ^b	P value ^c
Nervous system	255 (4.13)	62 (3.59)	33 (4.10)	11 (3.43)	12 (2.25)	0.27
Eye	48 (0.78)	19 (1.10)	7 (0.87)	2 (0.62)	2 (0.37)	0.47
Ear	14 (0.23)	2 (0.12)	5 (0.62)	2 (0.62)	2 (0.37)	0.07
Heart	1631 (26.39)	541 (31.29)	218 (27.06)	75 (23.42)	102 (19.08)	<0.001
Respiratory	21 (0.34)	4 (0.23)	1 (0.12)	1 (0.31)	0 (0.00)	0.57
Cleft lip/palate	135 (2.18)	26 (1.50)	16 (1.99)	8 (2.50)	7 (1.31)	0.33
Upper alimentary	33 (0.53)	6 (0.35)	3 (0.37)	0 (0.00)	1 (0.19)	0.45
Digestive system	329 (5.32)	65 (3.76)	32 (3.97)	9 (2.81)	15 (2.81)	<0.001
Male reproductive ^d	356 (10.64)	86 (9.58)	24 (5.61)	16 (9.30)	20 (6.79)	0.01
Urinary	275 (4.45)	47 (2.72)	32 (3.97)	12 (3.75)	15 (2.81)	0.01
Musculoskeletal	312 (5.05)	47 (2.72)	33 (4.10)	14 (4.37)	18 (3.37)	<0.001
Limb	44 (0.71)	18 (1.04)	3 (0.37)	2 (0.62)	1 (0.19)	0.20
Other musculoskeletal	54 (0.87)	24 (1.39)	6 (0.75)	5 (1.56)	2 (0.37)	0.12
DNA	102 (1.65)	30 (1.74)	15 (1.86)	7 (2.19)	12 (2.25)	0.83
Alcohol	4 (0.07)	1 (0.06)	0 (0.00)	0 (0.00)	1 (0.19)	0.68

^aSee Appendix A for ICD-9-CM birth defects codes and abbreviations.^bColumn count totals may reflect multiple birth defect diagnoses in some children.^cP values determined by Monte Carlo estimates for the Pearson chi-squared exact test.^dRates for “Male reproductive” defect category based on total male births for 2000.

Table 5. Types of Birth Defects and Maternal Military and Marital Status

Type of Birth Defects ^a	Military Single N = 5099 n (cases per 1000) ^b	Military Married N = 5586 n (cases per 1000) ^b	Dual Military Marriage N = 6819 n (cases per 1000) ^b	Dependent Wife N = 74,360 n (cases per 1000) ^b	Other N = 3840 n (cases per 1000) ^b	P value ^c
Nervous system	21 (4.12)	21 (3.76)	18 (2.64)	305 (4.10)	8 (2.08)	0.42
Eye	6 (1.18)	7 (1.25)	4 (0.59)	60 (0.81)	1 (0.26)	0.67
Ear	0 (0.00)	2 (0.36)	3 (0.44)	19 (0.26)	1 (0.26)	0.01
Heart	135 (26.48)	157 (28.11)	177 (25.96)	2032 (27.33)	66 (17.19)	0.59
Respiratory	1 (0.20)	1 (0.18)	0 (0.00)	24 (0.32)	1 (0.26)	0.34
Cleft lip/palate	8 (1.57)	13 (2.33)	12 (1.76)	156 (2.10)	3 (0.78)	0.82
Upper alimentary	4 (0.78)	3 (0.54)	3 (0.44)	32 (0.43)	1 (0.26)	0.49
Digestive system	21 (4.12)	18 (3.22)	32 (4.69)	363 (4.88)	16 (4.17)	0.15
Male reproductive ^d	19 (7.15)	30 (10.36)	30 (8.38)	411 (10.23)	12 (5.78)	0.04
Urinary	21 (4.12)	17 (3.04)	17 (2.49)	318 (4.28)	8 (2.08)	0.59
Musculoskeletal	21 (4.12)	31 (5.55)	25 (3.67)	328 (4.41)	19 (4.95)	0.46
Limb	5 (0.98)	7 (1.25)	6 (0.88)	48 (0.65)	2 (0.52)	0.01
Other musculoskeletal	9 (1.77)	5 (0.90)	14 (2.05)	62 (0.83)	1 (0.26)	0.78
DNA	7 (1.37)	11 (1.97)	10 (1.47)	129 (1.74)	9 (2.34)	0.32
Alcohol	0 (0.00)	0 (0.00)	0 (0.00)	5 (0.07)	1 (0.26)	0.42

^aSee Appendix A for ICD-9-CM birth defects codes and abbreviations.^bColumn count totals may reflect multiple birth defect diagnoses in some children.^cP values determined by Monte Carlo estimates for the Pearson chi-squared exact test.^dRates for “Male reproductive” defect category based on total male births for 2000.

Table 6. Types of Birth Defects and Pay Grade of Sponsor*

Type of Birth Defects ^a	E1–E3 N = 20,255 n (cases per 1000) ^b	E4–E6 N = 49,800 n (cases per 1000) ^b	E7–E9 N = 5101 n (cases per 1000) ^b	O1–O3 N = 11,400 n (cases per 1000) ^b	O4–O8 N = 3835 n (cases per 1000) ^b	W1–W5 N = 789 n (cases per 1000) ^b	Unknown N = 4524 n (cases per 1000) ^b	<i>P</i> value ^c
Nervous system	83 (4.10)	187 (3.76)	26 (5.10)	50 (4.39)	17 (4.43)	7 (8.87)	3 (0.66)	0.49
Eye	19 (0.94)	40 (0.80)	4 (0.78)	12 (1.05)	3 (0.78)	0 (0.00)	0 (0.00)	0.85
Ear	7 (0.35)	13 (0.26)	2 (0.39)	1 (0.09)	1 (0.26)	0 (0.00)	1 (0.22)	<0.001
Heart	560 (27.65)	1390 (27.91)	151 (29.60)	288 (25.26)	118 (30.77)	22 (27.88)	38 (8.40)	0.30
Respiratory	6 (0.30)	16 (0.32)	0 (0.00)	2 (0.18)	3 (0.78)	0 (0.00)	0 (0.00)	0.29
Cleft lip/palate	44 (2.17)	110 (2.21)	9 (1.76)	18 (1.58)	6 (1.57)	2 (2.54)	3 (0.66)	0.04
Upper alimentary	11 (0.54)	15 (0.30)	4 (0.78)	8 (0.70)	5 (1.30)	0 (0.00)	0 (0.00)	0.01
Digestive system	112 (5.53)	251 (5.04)	15 (2.94)	44 (3.86)	16 (4.17)	3 (3.80)	9 (1.99)	<0.001
Male reproductive ^d	80 (7.57)	280 (10.65)	15 (5.56)	87 (14.37)	25 (12.37)	7 (17.37)	8 (2.39)	0.00
Urinary	79 (3.90)	204 (4.10)	20 (3.92)	42 (3.68)	26 (6.78)	5 (6.34)	5 (1.11)	0.07
Musculoskeletal	80 (3.95)	222 (4.46)	29 (5.69)	64 (5.61)	17 (4.43)	2 (2.54)	10 (2.21)	0.79
Limb	14 (0.69)	35 (0.70)	6 (1.18)	7 (0.61)	4 (1.04)	0 (0.00)	2 (0.44)	0.06
Other musculoskeletal	26 (1.28)	53 (1.06)	4 (0.78)	7 (0.61)	1 (0.26)	0 (0.00)	0 (0.00)	<0.001
DNA	27 (1.33)	77 (1.55)	18 (3.53)	22 (1.93)	15 (3.91)	2 (2.54)	5 (1.11)	0.52
Alcohol	0 (0.00)	4 (0.08)	0 (0.00)	1 (0.09)	0 (0.00)	0 (0.00)	1 (0.22)	0.15

*E indicates enlisted; O, officer; and W, warrant officer.

^aSee Appendix A for ICD-9-CM birth defects codes and abbreviations.^bColumn count totals may reflect multiple birth defect diagnoses in some children.^c*P* values determined by Monte Carlo estimates for the Pearson chi-squared exact test.^dRates for “Male reproductive” defect category based on total male births for 2000.

Table 7. Types of Birth Defects and Branch of Service of Sponsor

Type of Birth Defects ^a	Army N = 33,023 n (cases per 1000) ^b	Navy N = 22,439 n (cases per 1000) ^b	Marines N = 10,889 n (cases per 1000) ^b	Air Force N = 23,037 n (cases per 1000) ^b	Unknown N = 6316 n (cases per 1000) ^b	P value ^c
Nervous system	120 (3.63)	89 (3.97)	42 (3.86)	101 (4.38)	21 (3.33)	0.63
Eye	22 (0.67)	21 (0.94)	13 (1.19)	20 (0.87)	2 (0.32)	0.25
Ear	11 (0.33)	6 (0.27)	5 (0.46)	2 (0.09)	1 (0.16)	0.25
Heart	923 (27.95)	622 (27.72)	292 (26.82)	579 (25.13)	151 (23.91)	0.17
Respiratory	6 (0.18)	3 (0.13)	6 (0.55)	10 (0.43)	2 (0.32)	0.08
Cleft lip/palate	64 (1.94)	54 (2.41)	25 (2.30)	44 (1.91)	5 (0.79)	0.13
Upper alimentary	14 (0.42)	12 (0.54)	3 (0.28)	12 (0.52)	2 (0.32)	0.79
Digestive system	146 (4.42)	100 (4.46)	68 (6.25)	107 (4.65)	29 (4.59)	0.19
Male reproductive ^d	164 (9.32)	125 (10.48)	55 (9.35)	128 (10.22)	30 (8.73)	0.81
Urinary	129 (3.91)	90 (4.01)	47 (4.32)	96 (4.17)	19 (3.01)	0.75
Musculoskeletal	155 (4.69)	97 (4.32)	31 (2.85)	112 (4.86)	29 (4.59)	0.11
Limb	27 (0.82)	13 (0.58)	6 (0.55)	21 (0.91)	1 (0.16)	0.25
Other musculoskeletal	41 (1.24)	20 (0.89)	7 (0.64)	19 (0.83)	4 (0.63)	0.30
DNA	58 (1.76)	30 (1.34)	26 (2.39)	36 (1.56)	16 (2.53)	0.12
Alcohol	1 (0.03)	2 (0.09)	0 (0.00)	2 (0.09)	1 (0.16)	0.67

^aSee Appendix A for ICD-9-CM birth defects codes and abbreviations.^bColumn count totals may reflect multiple birth defect diagnoses in some children.^cP values determined by Monte Carlo estimates for the Pearson chi-squared exact test.^dRates for “Male reproductive” defect category based on total male births for 2000.

Table 8. Types of Birth Defects and Geographical Location of Birth*

Type of Birth Defects ^a	California N = 10,161 n (cases per 1000) ^b	Florida N = 4640 n (cases per 1000) ^b	Georgia N = 3879 n (cases per 1000) ^b	Germany N = 2152 n (cases per 1000) ^b	Hawaii N = 2723 n (cases per 1000) ^b	Japan N = 2254 n (cases per 1000) ^b	Kentucky N = 2637 n (cases per 1000) ^b	Maryland N = 2060 n (cases per 1000) ^b	N. Carolina N = 6644 n (cases per 1000) ^b	Other NE ^d N = 6884 n (cases per 1000) ^b
Nervous system	45 (4.43)	20 (4.31)	17 (4.38)	9 (4.18)	5 (1.84)	3 (1.33)	13 (4.93)	5 (2.43)	21 (3.16)	35 (5.08)
Eye	8 (0.79)	2 (0.43)	1 (0.26)	2 (0.93)	2 (0.73)	1 (0.44)	1 (0.38)	3 (1.46)	7 (1.05)	4 (0.58)
Ear	6 (0.59)	0 (0.00)	1 (0.26)	1 (0.47)	1 (0.37)	4 (1.78)	1 (0.38)	0 (0.00)	3 (0.45)	0 (0.00)
Heart	303 (29.82)	115 (24.78)	78 (20.11)	31 (14.41)	53 (19.46)	21 (9.32)	124 (47.02)	56 (27.18)	163 (24.53)	211 (30.65)
Respiratory	4 (0.39)	1 (0.22)	1 (0.26)	2 (0.93)	0 (0.00)	1 (0.44)	0 (0.00)	1 (0.49)	4 (0.60)	2 (0.29)
Cleft lip/palate	16 (1.58)	13 (2.80)	8 (2.06)	2 (0.93)	6 (2.20)	4 (1.78)	5 (1.90)	4 (1.94)	11 (1.66)	15 (2.18)
Upper alimentary	6 (0.59)	0 (0.00)	1 (0.26)	1 (0.47)	1 (0.37)	0 (0.00)	2 (0.76)	0 (0.00)	1 (0.15)	2 (0.29)
Digestive system	46 (4.53)	31 (6.68)	18 (4.64)	9 (4.18)	14 (5.14)	2 (0.89)	9 (3.41)	7 (3.40)	40 (6.02)	32 (4.65)
Male reproductive ^h	46 (8.61)	22 (9.21)	10 (4.90)	10 (8.70)	11 (7.61)	8 (6.50)	9 (6.53)	17 (15.22)	38 (11.09)	47 (12.94)
Urinary	53 (5.22)	19 (4.10)	16 (4.13)	10 (4.65)	5 (1.84)	3 (1.33)	9 (3.41)	7 (3.40)	36 (5.42)	34 (4.94)
Musculoskeletal	37 (3.64)	28 (6.03)	7 (1.81)	9 (4.18)	6 (2.20)	7 (3.11)	4 (1.52)	10 (4.85)	21 (3.16)	23 (3.34)
Limb	2 (0.20)	3 (0.65)	2 (0.52)	3 (1.39)	3 (1.10)	0 (0.00)	1 (0.38)	1 (0.49)	6 (0.90)	8 (1.16)
Other musculoskeletal	6 (0.59)	4 (0.86)	5 (1.29)	5 (2.32)	3 (1.10)	0 (0.00)	3 (1.14)	2 (0.97)	8 (1.20)	7 (1.02)
DNA	14 (1.38)	2 (0.43)	7 (1.81)	3 (1.39)	4 (1.47)	3 (1.33)	4 (1.52)	0 (0.00)	9 (1.36)	5 (0.73)
Alcohol	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)

Table 8. Types of Birth Defects and Geographic Location of Birth (*cont.*)

Type of Birth Defects ^a	Other NW ^c N = 10,308 n (cases per 1000) ^b	Other SE ^f N = 3922 n (cases per 1000) ^b	Other SW ^g N = 5763 n (cases per 1000) ^b	Texas N = 8146 n (cases per 1000) ^b	Virginia N = 8726 n (cases per 1000) ^b	Washington N = 4064 n (cases per 1000) ^b	Foreign N = 3873 n (cases per 1000) ^b	Unknown N = 6868 n (cases per 1000) ^b	P value ^c
Nervous system	37 (3.59)	15 (3.83)	25 (4.34)	32 (3.93)	31 (3.55)	15 (3.69)	15 (3.87)	30 (4.37)	0.63
Eye	8 (0.78)	4 (1.02)	7 (1.22)	8 (0.98)	11 (1.26)	6 (1.48)	0 (0.00)	3 (0.44)	0.53
Ear	2 (0.19)	1 (0.26)	2 (0.35)	1 (0.12)	0 (0.00)	2 (0.49)	0 (0.00)	0 (0.00)	0.01
Heart	292 (28.33)	96 (24.48)	114 (19.78)	211 (25.90)	234 (26.82)	142 (34.94)	76 (19.62)	247 (35.96)	<0.001
Respiratory	4 (0.39)	0 (0.00)	2 (0.35)	1 (0.12)	1 (0.12)	1 (0.25)	1 (0.26)	1 (0.15)	0.83
Cleft lip/palate	31 (3.01)	7 (1.79)	10 (1.74)	12 (1.47)	20 (2.29)	6 (1.48)	10 (2.58)	12 (1.75)	0.75
Upper alimentary	4 (0.39)	2 (0.51)	2 (0.35)	7 (0.86)	3 (0.34)	0 (0.00)	2 (0.52)	9 (1.31)	0.14
Digestive system	49 (4.75)	26 (6.63)	23 (3.99)	39 (4.79)	33 (3.78)	22 (5.41)	14 (3.62)	36 (5.24)	0.20
Male reproductive ^h	57 (10.18)	22 (10.70)	34 (11.55)	44 (10.15)	49 (10.89)	25 (11.54)	13 (6.39)	40 (8.73)	0.15
Urinary	47 (4.56)	10 (2.55)	26 (4.51)	34 (4.17)	24 (2.75)	13 (3.20)	13 (3.36)	22 (3.20)	0.08
Musculoskeletal	37 (3.59)	11 (2.81)	23 (3.99)	21 (2.58)	35 (4.01)	96 (23.62)	19 (4.91)	30 (4.37)	<0.001
Limb	9 (0.87)	1 (0.26)	2 (0.35)	6 (0.74)	5 (0.57)	4 (0.98)	4 (1.03)	8 (1.17)	0.51
Other musculoskeletal	5 (0.49)	2 (0.51)	10 (1.74)	7 (0.86)	9 (1.03)	7 (1.72)	3 (0.78)	5 (0.73)	0.32
DNA	18 (1.75)	14 (3.57)	12 (2.08)	17 (2.09)	22 (2.52)	9 (2.22)	4 (1.03)	19 (2.77)	0.75
Alcohol	1 (0.10)	0 (0.00)	0 (0.00)	1 (0.12)	1 (0.12)	1 (0.25)	0 (0.00)	2 (0.29)	0.43

^aSee Appendix A for ICD-9-CM birth defects codes and abbreviations.^bColumn count totals may reflect multiple birth defect diagnoses in some children.^cP values determined by Monte Carlo estimates for the Pearson chi-squared exact test.^dNortheast (17 states): Connecticut, District of Columbia., Illinois, Indiana, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, Wisconsin.^eNorthwest (15 states): Alaska, Colorado, Idaho, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, Nevada, North Dakota, Oregon, South Dakota, Utah, Wyoming.^fSoutheast (4 states): Alabama, Mississippi, South Carolina, Tennessee.^gSouthwest (4 states): Arizona, Arkansas, Louisiana, New Mexico, Oklahoma.^hRates for “Male reproductive” defect category based on total male births for 2000.

Table 9a. Types of Birth Defects and Mother's Occupational Code for Births to Military Mothers

Type of Birth Defects ^a	IN N = 1421 n (cases per n 1000) ^b	ER N = 1212 n (cases per n 1000) ^b	CI N = 1466 n (cases per n 1000) ^b	HC N = 3264 n (cases per n 1000) ^b	OT N = 421 n (cases per n 1000) ^b	FS N = 5837 n (cases per n 1000) ^b	EM N = 1474 n (cases per n 1000) ^b	BU N = 295 n (cases per n 1000) ^b	SS N = 1844 n (cases per n 1000) ^b	NS N = 251 n (cases per n 1000) ^b	Unknown N = 19 n (cases per n 1000) ^b	P value ^c
Nervous system	9 (6.33)	5 (4.13)	0 (0.00)	14 (4.29)	1 (2.38)	17 (2.91)	6 (4.07)	0 (0.00)	5 (2.71)	3 (11.95)	0 (0.00)	0.13
Eye	2 (1.41)	0 (0.00)	1 (0.68)	3 (0.92)	0 (0.00)	6 (1.03)	3 (2.04)	0 (0.00)	2 (1.09)	0 (0.00)	0 (0.00)	0.88
Ear	0 (0.00)	2 (1.65)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.17)	0 (0.00)	1 (3.39)	1 (0.54)	0 (0.00)	0 (0.00)	0.06
Heart	50 (35.19)	21 (17.33)	41 (27.97)	91 (27.88)	12 (28.50)	160 (27.41)	40 (27.14)	10 (33.90)	37 (20.07)	7 (27.89)	0 (0.00)	0.23
Respiratory	0 (0.00)	1 (0.83)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.54)	0 (0.00)	0 (0.00)	0.23
Cleft lip/palate	2 (1.41)	3 (2.48)	2 (1.36)	7 (2.15)	2 (4.75)	8 (1.37)	4 (2.71)	0 (0.00)	3 (1.63)	2 (7.97)	0 (0.00)	0.40
Upper alimentary	1 (0.70)	1 (0.83)	0 (0.00)	4 (1.23)	0 (0.00)	4 (0.69)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0.70
Digestive system	7 (4.93)	1 (0.83)	4 (2.73)	12 (3.68)	0 (0.00)	22 (3.77)	10 (6.78)	0 (0.00)	8 (4.34)	7 (27.89)	0 (0.00)	<0.001
Male reproductive ^d	7 (9.21)	4 (6.39)	6 (7.81)	25 (14.76)	3 (13.45)	24 (7.80)	4 (5.18)	0 (0.00)	5 (5.43)	1 (7.46)	0 (0.00)	0.28
Urinary	6 (4.22)	3 (2.48)	4 (2.73)	6 (1.84)	0 (0.00)	21 (3.60)	6 (4.07)	2 (6.78)	6 (3.25)	1 (3.98)	0 (0.00)	0.77
Musculoskeletal	4 (2.82)	3 (2.48)	5 (3.41)	15 (4.60)	3 (7.13)	21 (3.60)	14 (9.50)	0 (0.00)	11 (5.97)	1 (3.98)	0 (0.00)	0.18
Limb	0 (0.00)	0 (0.00)	1 (0.68)	8 (2.45)	1 (2.38)	3 (0.51)	4 (2.71)	0 (0.00)	1 (0.54)	0 (0.00)	0 (0.00)	0.08
Other musculoskeletal	4 (2.82)	3 (2.48)	4 (2.73)	1 (0.31)	1 (2.38)	9 (1.54)	2 (1.36)	0 (0.00)	4 (2.17)	0 (0.00)	0 (0.00)	0.53
DNA	4 (2.82)	3 (2.48)	1 (0.68)	7 (2.15)	0 (0.00)	10 (1.71)	2 (1.36)	0 (0.00)	1 (0.54)	0 (0.00)	0 (0.00)	0.69
Alcohol	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	NA

*IN indicates Infantry; ER, Electrical Repair; CI, Communication and Intelligence; HC, healthcare; OT, Other Technical; FS, Functional Support; EM, Electrical Mechanic; BU, Builder/Craftsman; SS, Service Supply; and NS, Not Specified.

^aSee Appendix A for ICD-9-CM birth defects codes and abbreviations.

^bColumn count totals may reflect multiple birth defect diagnoses in some children.

^cP values determined by Monte Carlo estimates for the Pearson chi-squared exact test.

^dRates for "Male reproductive" defect category based on total male births for 2000.

Table 9b. Types of Birth Defects and Father's Occupational Code for Births to Military Fathers*

Type of Birth Defects ^a	IN N = 19,079 n (cases per 1000) ^b	ER N = 7399 n (cases per 1000) ^b	CI N = 5815 n (cases per 1000) ^b	HC N = 4958 n (cases per 1000) ^b	OT N = 2037 n (cases per 1000) ^b	FS N = 10,753 n (cases per 1000) ^b	EM N = 13,692 n (cases per 1000) ^b	BU N = 2590 n (cases per 1000) ^b	SS N = 6173 n (cases per 1000) ^b	NS N = 1775 n (cases per 1000) ^b	Unknown N = 89 n (cases per 1000) ^b	P value ^c
Nervous system	87 (4.56)	34 (4.60)	30 (5.16)	11 (2.22)	6 (2.95)	46 (4.28)	49 (3.58)	12 (4.63)	26 (4.21)	4 (2.25)	0 (0.00)	0.38
Eye	18 (0.94)	6 (0.81)	6 (1.03)	3 (0.61)	2 (0.98)	10 (0.93)	6 (0.44)	3 (1.16)	5 (0.81)	1 (0.56)	0 (0.00)	0.95
Ear	2 (0.11)	1 (0.14)	2 (0.34)	1 (0.20)	2 (0.98)	0 (0.00)	7 (0.51)	1 (0.39)	3 (0.49)	0 (0.00)	0 (0.00)	0.13
Heart	503 (26.36)	215 (29.06)	150 (25.80)	134 (27.03)	64 (31.42)	300 (27.90)	360 (26.29)	75 (28.96)	193 (31.27)	37 (20.85)	1 (11.24)	0.36
Respiratory	2 (0.11)	7 (0.95)	1 (0.17)	0 (0.00)	0 (0.00)	5 (0.47)	5 (0.37)	1 (0.39)	3 (0.49)	0 (0.00)	0 (0.00)	0.08
Cleft lip/palate	38 (1.99)	21 (2.84)	8 (1.38)	12 (2.42)	3 (1.47)	18 (1.67)	30 (2.19)	7 (2.70)	17 (2.75)	2 (1.13)	0 (0.00)	0.59
Upper alimentary	9 (0.47)	5 (0.68)	1 (0.17)	2 (0.40)	0 (0.00)	2 (0.19)	6 (0.44)	2 (0.77)	5 (0.81)	0 (0.00)	0 (0.00)	0.55
Digestive system	93 (4.87)	38 (5.14)	25 (4.30)	11 (2.22)	15 (7.36)	43 (4.00)	75 (5.48)	14 (5.41)	40 (6.48)	9 (5.07)	0 (0.00)	0.07
Male reproductive ^d	96 (9.36)	43 (11.11)	32 (10.01)	31 (11.81)	10 (8.68)	69 (11.77)	75 (10.09)	12 (8.40)	32 (9.64)	11 (11.62)	0 (0.00)	0.89
Urinary	80 (4.19)	38 (5.14)	26 (4.47)	23 (4.64)	7 (3.44)	44 (4.09)	51 (3.73)	13 (5.02)	30 (4.86)	6 (3.38)	0 (0.00)	0.93
Musculoskeletal	89 (4.67)	27 (3.65)	27 (4.64)	29 (5.85)	9 (4.42)	41 (3.81)	50 (3.65)	16 (6.18)	29 (4.70)	11 (6.20)	0 (0.00)	0.43
Limb	18 (0.94)	6 (0.81)	4 (0.69)	4 (0.81)	2 (0.98)	6 (0.56)	1 (0.07)	1 (0.39)	4 (0.65)	2 (1.13)	0 (0.00)	0.27
Other musculoskeletal	14 (0.73)	6 (0.81)	5 (0.86)	2 (0.40)	1 (0.49)	7 (0.65)	13 (0.95)	1 (0.39)	9 (1.46)	4 (2.25)	0 (0.00)	0.38
DNA	30 (1.57)	13 (1.76)	7 (1.20)	6 (1.21)	8 (3.93)	23 (2.14)	20 (1.46)	6 (2.32)	13 (2.11)	3 (1.69)	0 (0.00)	0.37
Alcohol	0 (0.00)	1 (0.14)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.09)	2 (0.15)	1 (0.39)	0 (0.00)	0 (0.00)	0 (0.00)	0.47

*IN indicates Infantry; ER, Electrical Repair; CI, Communication and Intelligence; HC, healthcare; OT, Other Technical; FS, Functional Support; EM, Electrical Mechanic; BU, Builder/Craftsman; SS, Service Supply; and NS, Not Specified.

^aSee Appendix A for ICD-9-CM birth defects codes and abbreviations.

^bColumn count totals may reflect multiple birth defect diagnoses in some children.

^cP values determined by Monte Carlo estimates for the Pearson chi-squared exact test.

^dRates for "Male reproductive" defect category based on total male births for 2000.

Table 10. Types of Birth Defects and Singleton or Multiple Births

Type of Birth Defects ^a	Singleton	Multiple	<i>P</i> value ^c
	N = 91,601 n (cases per 1000) ^b	N = 4103 n (cases per 1000) ^b	
Nervous system	340 (3.71)	33 (8.04)	<0.001
Eye	68 (0.74)	10 (2.44)	0.00
Ear	23 (0.25)	2 (0.49)	0.66
Heart	2334 (25.48)	233 (56.79)	<0.001
Respiratory	25 (0.27)	2 (0.49)	0.64
Cleft lip/palate	174 (1.90)	18 (4.39)	0.00
Upper alimentary	38 (0.42)	5 (1.22)	0.05
Digestive system	420 (4.59)	30 (7.31)	0.01
Male reproductive ^d	479 (9.73)	23 (10.79)	0.66
Urinary	362 (3.95)	19 (4.63)	0.50
Musculoskeletal	409 (4.47)	15 (3.66)	0.47
Limb	65 (0.71)	3 (0.73)	1.00
Other musculoskeletal	91 (0.99)	0 (0.00)	0.06
DNA	155 (1.69)	11 (2.68)	0.20
Alcohol	6 (0.07)	0 (0.00)	1.00

^aSee Appendix A for ICD-9-CM birth defects codes and abbreviations.

^bColumn count totals may reflect multiple birth defect diagnoses in some children.

^c*P* values determined by Monte Carlo estimates for the Pearson chi-squared exact test.

^dRates for “Male reproductive” defect category based on total male births for 2000.

Table 11. Multivariable Logistic Regression Model: Adjusted Odds Ratios for Any Birth Defect Among Military Beneficiaries*

Characteristics of Military Beneficiaries	No Birth Defect	Any Birth Defect		
	N	N	OR	CI
Total	91,159	4545		
Gender of infant				
Male	48,732	2642	^a	
Female	42,427	1903	0.80	0.76-0.85
Maternal age, y				
13-19	7257	331	0.96	0.85-1.08
20-24	29,905	1477	^a	
25-29	24,247	1141	0.96	0.88-1.04
30-34	15,553	832	1.11	1.00-1.22
35-39	6038	355	1.24	1.09-1.42
>39	978	81	1.81	1.42-2.32
Other/Unknown	7181	328	1.09	0.96-1.25
Race/ethnicity of military sponsor				
White	58,757	3050	^a	
Black	16,470	821	0.98	0.91-1.07
Hispanic	7697	360	0.93	0.83-1.05
Asian	3073	130	0.84	0.70-1.01
Other/Unknown	5162	184	1.07	0.91-1.26
Maternal military and marital status				
Military, single	4854	245	1.02	0.89-1.17
Military, married	5331	255	0.94	0.82-1.07
Dual military marriage	6533	286	0.87	0.77-0.98
Dependent wife	70,733	3627	^a	
Other	3708	132	1.15	0.89-1.49
Pay grade of sponsor				
E1-E3	19,293	962	0.99	0.91-1.08
E4-E6	47,355	2445	^a	
E7-E9	4851	250	0.86	0.75-0.99
O1-O3	10,844	556	0.94	0.86-1.04
O4-O8	3623	212	0.93	0.79-1.08
W1-W5	745	44	1.02	0.75-1.40
Other/Unknown	4448	76	0.18	0.14-0.24

Table 11. Multivariable Logistic Regression Model: Adjusted Odds Ratios for Any Birth Defect Among Military Beneficiaries*
(*cont.*)

Characteristics of Military Beneficiaries	No Birth Defect	Any Birth Defect	OR	CI
	91,159	4545		
	N	N		
Branch of service of sponsor				
Army	31,414	1609	a	
Navy	21,375	1064	0.94	0.85-1.03
Marines	10,374	515	1.01	0.90-1.13
Air Force	21,948	1089	1.01	0.93-1.10
Other/Unknown	6048	268	0.96	0.80-1.15
Geographical location of birth				
California	9692	469	a	
Florida	4412	228	1.08	0.91-1.27
Georgia	3731	148	0.79	0.65-0.96
Germany	2069	83	0.79	0.62-1.01
Hawaii	2627	96	0.74	0.59-0.93
Japan	2202	52	0.47	0.35-0.63
Kentucky	2464	173	1.39	1.15-1.69
Maryland	1966	94	1.01	0.80-1.27
North Carolina	6339	305	0.96	0.82-1.12
Other-NE ^b	6517	367	1.14	0.99-1.32
Other-NW ^c	9835	473	0.94	0.81-1.08
Other-SE ^d	3745	177	0.94	0.78-1.12
Other-SW ^e	5508	255	0.91	0.77-1.07
Texas	7776	370	0.96	0.83-1.12
Virginia	8320	406	1.01	0.88-1.16
Washington	3752	312	1.77	1.52-2.06
Other foreign	3715	158	0.85	0.71-1.03
Unknown	6489	379	1.07	0.91-1.26
Singleton or multiple births				
Singleton	87,329	4272	a	
Multiple	3830	273	1.37	1.21-1.56

*OR indicates odds ratio; CI, 95% confidence interval; E, enlisted, O, officer; and W, warrant officer.

^aReferent category.

^bNortheast (16 states): Connecticut, District of Columbia, Illinois, Indiana, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, Wisconsin.

^cNorthwest (15 states): Alaska, Colorado, Idaho, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, Nevada, North Dakota, Oregon, South Dakota, Utah, Wyoming.

^dSoutheast (4 states): Alabama, Mississippi, South Carolina, Tennessee.

^eSouthwest (4 states): Arizona, Arkansas, Louisiana, New Mexico, Oklahoma.

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Appendix A: ICD-9-CM Codes for Major Birth Defects

Abbreviation	Organ System	ICD-9-CM Code	ICD-9-CM Disease Category
CNS	Nervous System	740.0/740.1	Anencephalus
		741.1/741.9	Spina bifida
		742.0	Encephalocele
		742.1	Microcephalus
		742.3	Hydrocephalus without spina bifida
Eye	Eye	743.0/743.1	Anophthalmia/microphthalmia
		743.30–743.34	Cataract
		743.5	Aniridia
Ear	Ear	744.01/744.23	Anotia/microtia
Heart	Cardiovascular	745.0	Common truncus
		745.1	Transposition of great arteries
		745.2	Tetralogy of Fallot
		745.4	Ventricular septal defect
		745.5	Atrial septal defect
		745.6	Endocardial cushion defects
		746.01-746.02	Pulmonary valve atresia, stenosis
		746.1	Tricuspid valve atresia, stenosis
		746.2	Ebstein's anomaly
		746.3	Aortic valve stenosis
		746.7	Hypoplastic left heart syndrome
		747.0	Patent ductus arteriosus
		747.1	Coarctation of aorta
		747.3	Anomalies of pulmonary artery
Resp	Respiratory	748.0	Choanal atresia
		748.5	Lung agensis/hypoplasia/dysplasia
Cleft P/L	Cleft Palate	749.0	Cleft palate
	And/or Lip	749.1-749.2	Cleft lip with, without cleft palate
Upper AI	Upper Alimentary	750.3	Tracheoesophageal fistula, esophageal atresia and stenosis
Digestive	Digestive	751.2	Atresia and stenosis of large intestine, rectum and anal canal
		750.5	Pyloric stenosis
		751.3	Hirschsprung's disease
		751.6	Biliary atresia
Male	Male Reproductive	752.6	Hypospadias, epispadias
Urinary	Urinary	753.0	Renal agenesis/dysgenesis
		753.2/753.6	Obstructive genitourinary defects
		753.5	Bladder exstrophy
Musc	Certain Musculoskeletal	754.30/.31/.35	Congenital hip dislocation
Limbs	Limbs	755.20–755.29	Reduction deformity upper limbs
		755.3	Reduction deformity lower limbs
Other Musc	Other Musculoskeletal	756.6	Anomalies of diaphragm
		756.7	Anomalies of abdominal wall
DNA	Chromosomal	758.0	Down syndrome
		758.1	Trisomy 13
		758.2	Trisomy 18
Alcohol		760.71	Fetal alcohol syndrome
Other		759.0-759.9	Other and unspecified anomalies

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14. ABSTRACT (maximum 200 words)

The US Department of Defense (DoD) is challenged with monitoring and protecting the health and well-being of its service members. The growing number of women on active duty and the diverse hazardous exposures associated with military service make reproductive health issues a special concern. To address this concern, the DoD Birth and Infant Health Registry was established at the DoD Center for Deployment Health Research, located at the Naval Health Research Center in San Diego, California. The DoD Birth and Infant Health Registry captures comprehensive data on healthcare utilization to calculate the prevalence of birth defects among children born to military families. Population-based electronic surveillance is supplemented by active case validation efforts. In 2000, the DoD Birth and Infant Health Registry captured data on the 95,704 livebirths that occurred in US military families worldwide. This report presents detailed data on these infants using nationally standardized definitions for major congenital anomalies diagnosed before 1 year of age. These results complement civilian public health surveillance efforts and may be especially valuable to military members and their families.

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